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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,298	02/06/2004	William Allen Rogers JR.	VEL03-GN003	5458

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EXAMINER	
MERKLING, MATTHEW J	
ART UNIT	**PAPER NUMBER**
1764	

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08/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/774,298	ROGERS ET AL.	
	Examiner	Art Unit	
	Matthew J. Merkling	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33 and 48-90* is/are pending in the application.

4a) Of the above claim(s) *48-90* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/25/04 and 7/16/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I (claims 1-33) in the reply filed on 7/16/07 is acknowledged.

Claims 48-90 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 6/21/07. Applicant's amendments to claims directed to non-elected inventions do not overcome the restriction requirement and are therefore withdrawn.

Claim Analysis

2. It is noted that claims 1-33 are recited as a "system" which does not clearly set forth which statutory category the invention belongs. It has been determined that the claims are directed to an apparatus and the appropriate principles for interpreting claims for that particular category of invention have been applied.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2 and 13-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Toole et al. (US 4,167,915).

Regarding claim 1, Toole discloses a chemical process system (see Drawing) comprising:

a first unit operation (11) adapted to be in fluid communication with an inlet stream (53, 54) and an outlet stream (23);

a pressure vessel (housing, (5)) containing the first unit operation therein (see Drawing), the pressure vessel concurrently adapted to be occupied by an inert medium (nitrogen, col. 4 lines 6-11); and

a purge stream (21) adapted to be in fluid communication with an inert medium source (nitrogen, (41)) and in fluid communication with the first unit operation (see Drawing).

Regarding claim 2, Toole, as discussed in claim 1 above, further discloses the first unit operation contains a

chemical reactor (reaction chamber, (12), col. 3 lines 3-17).

Regarding claims 13-15, Toole, as discussed in claim 1 above, further discloses a controller (regulator, (61)) in communication with a first pressure sensor (see Drawing) detecting the pressure inside the pressure vessel (6), and in communication with a second pressure sensor (see Drawing) which detects changes in pressure (such as leaks) inside the first unit operation and controls the pressure by allowing flow of the inert medium past (venting) the pressure regulator and keep the pressures of the vessel and first unit operation at desired levels (col. 4 lines 26-45).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1-8 and 10-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett et al. (US 6,192,596) in view of Toole et al. (US 4,167,915) as evidenced by Frazier et al. (US 6,136,171) and Valentijn (US 4,253,417).

Regarding claims 1, 2, 8, 12 , Bennett discloses a first unit operation containing a chemical reactor (partial oxidation, see Fig. 2a) in fluid communications with an inlet stream ('reactant gas in' see Fig. 2a) and an outlet stream ('product gas out', see Fig. 2a).

While Bennett discloses a first unit operation with microchannels (see abstract), Bennett fails to disclose said first unit operation inside a pressure vessel with an inert medium source supplying an inert stream flow into said pressure vessel and surrounding the first unit operation.

Toole also discloses a pressure vessel that encloses a unit operation.

Toole teaches a unit operation (wafer oxidation, (11)) that is enclosed in a pressure vessel (shell, 5) and has a inert source (nitrogen, (41)) that flows nitrogen into the pressure vessel (5) via port (21) and keeps the inside of the pressure vessel at a desired pressure (col. 3 lines 3-17).

It is well known in the art that microchannels can leak reactants out of the microchannel (as is evidenced by Frazier (see Example 3) when the microchannels are tested for leaking before operation) and that a preferable way of keeping problems associated with leaking reactors to a minimum is keeping that reactor in an inert environment with an external pressure greater than the internal pressure so as to avoid reactants leaking out (see Valentijn, col. 8 lines 37-41)

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the pressure vessel with an inert source supplying nitrogen to said pressure vessel, as in Toole, as an encasement of the first unit operation of Bennett (which contains microchannels) in order to prevent leaking of reactants.

Regarding claims 3, 4, 5 and 16, Bennett, as discussed in claim 1 above, further discloses a second unit operation (combustor catalyst, see Fig. 2a) in thermal communication with the first unit operation (heat from combustor section (250) used to heat catalytic reaction section (200), col. 5 lines 56-60). Bennett further discloses the first unit operation (200) and second unit operation (250) are fabricated using microchannels (col. 5 line 62 - col. 6 line 3). Bennett also illustrates the first and second unit operations as a single unit (see Fig. 2a) and forming a module.

Regarding claim 6, Bennett, as discussed claim 2 above, further discloses the chemical reactor (partial oxidation, (200)) has an inlet stream containing a reactant (see Fig. 2a) and an outlet stream containing a product (see Fig. 2a).

Regarding claim 7, the method of operating the chemical process system does not add any limitations to an apparatus claim (see MPEP §2114).

Regarding claims 10 and 11, Bennett, as discussed in claim 6 above, further discloses a catalyst layer/lining (partial oxidation catalyst, see claim 17 of Bennett) in the microchannels (see Fig. 2a).

Regarding claims 17-27 and 32 Bennett discloses a first unit operation containing a chemical reactor (partial oxidation, see Fig. 2a) in fluid communications with an inlet stream ('reactant gas in' see Fig. 2a) and an outlet stream ('product gas out', see Fig. 2a).

While Bennett discloses a first unit operation with microchannels (see abstract), Bennett fails to disclose said first unit operation inside a pressure vessel with an inert medium source supplying an inert stream flow into said pressure vessel and surrounding the first unit operation.

Toole also discloses a pressure vessel that encloses a unit operation.

Toole teaches a unit operation (wafer oxidation, (11)) that is enclosed in a pressure vessel (shell, 5) and has a inert source/purge (nitrogen, (41)) that flows nitrogen into the pressure vessel (5) via port (21) and keeps the inside of the pressure vessel at a desired pressure (col. 3 lines 3-17) by utilizing a regulator (61).

It is well known in the art that microchannels can leak reactants out of the microchannel (as is evidenced by Frazier (see Example 3) when the microchannels are tested for leaking before operation) and that a preferable way of

keeping problems associated with leaking reactors to a minimum is keeping that reactor in an inert environment with an external pressure greater than the internal pressure so as to avoid reactants leaking out (see Valentijn, col. 8 lines 37-41)

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the pressure vessel with an inert source supplying nitrogen to said pressure vessel, as in Toole, as an encasement of the first unit operation of Bennett (which contains microchannels) in order to prevent leaking of reactants.

Regarding further discloses a second unit operation (combustor catalyst, see Fig. 2a) in thermal communication (i.e. heat exchanger) with the first unit operation (heat from combustor section (250) used to heat catalytic reaction section (200), col. 5 lines 56-60). Bennett further discloses the second unit operation is in communication with an inlet reactant stream (fuel, air, see Fig. 2a) and an outlet product stream (gas out, see Fig. 2a). Bennett further discloses the first unit operation (200) and second unit operation (250) are fabricated using microchannels (col. 5 line 62 - col. 6 line 3). Bennett also illustrates the first and second

unit operations as a single unit (see Fig. 2a) and forming a module.

Regarding claim 22, Bennett, as discussed in claim 17 above,

Regarding claim 28, modified Bennett, as discussed in claim 25 above, does not explicitly disclose multiple microchannel modules located in the pressure vessel. However, increasing the number of modules would have been an obvious improvement to one of ordinary skill in the art to increase the capacity and throughput of said chemical process system.

Regarding claims 29 and 30, Bennett, as discussed in claim 25 above, further discloses both unit operations contain catalyst in series with respective microchannels (as discussed above, see Fig. 2a). Bennett, further discloses the microchannels of the first and second unit operations are in thermal communication with each other, therefore qualifying as a heat exchanger.

Regarding claim 31, Bennett, as discussed in claim 30 above, further discloses that the flow in said microchannels can be counter-current depending on the required heat transfer application (col. 4 lines 3-9).

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett et al. (US 6,192,596) and Toole et al. (US 4,167,915) as applied to claim 1 above, and further in view of Bergh et al. (US 2002/0170976).

Regarding claim 7, modified Bennett, as discussed in claim 1 above, discloses a need for heat transfer from the first unit operation (partial oxidation), but fails to teach water being used as an inert medium.

Bergh also discloses a reactor contained in a vessel that requires thermal control (see abstract).

Bergh teaches a liquid (water, for instance) as a fluid passed over a reactor because of a liquid's higher thermal conductivity and greater capacity to remove heat away from a reactor (paragraph 11 and 24).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a liquid (water), as in Bergh, as the inert medium of modified Bennett in order to utilize a liquid's higher thermal conductivity when utilized as a heat transfer agent.

9. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett et al. (US 6,192,596) and Toole et al.

(US 4,167,915) as applied to claim 17 above, and further in view of Valladares Barrocas et al. (US 4,232,179).

Regarding claim 33, modified Bennett, fails to teach the pressure vessel including a recycle stream of the inert compressive medium.

It would have been obvious to one of ordinary skill in the art to add a recycle stream to the pressure vessel of Bennett in order to gain economic advantage for using less material, as is taught by Valladares Barrocas (col. 3 lines 47-52).

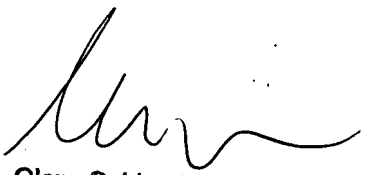
Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Merkling whose telephone number is (571) 272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJM



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